Patent Claims

1. Apparatus for the photometric measurement of concentration of at least one chemical substance in a solution (11),
wherein a cuvette (3) is provided, for containing the solution,
wherein the cuvette (3) is transmissive for electromagnetic radiation, at least in predetermined regions (12, 13),
wherein a transmitting unit (2) is provided, which produces electromagnetic radiation in at least two wavelength regions and radiates into the cuvette (3), wherein the electromagnetic radiation in a first wavelength range serves for measuring purposes and wherein the electromagnetic radiation in a second wavelength region is used for reference purposes, and wherein the electromagnetic radiation in the two wavelength regions takes the same path through the cuvette (3) and through the solution,
wherein at least one detector unit (4) is provided, which is so arranged that it receives the electromagnetic radiation in the at least two wavelength ranges following its passage through the solution (11),
and
wherein a control/evaluation unit (14) is provided, which determines the concentration of the chemical substance in the solution (11) on the basis of the electromagnetic radiation detected in the two wavelength regions.

2. Apparatus as claimed in claim 1,
wherein essentially oppositely lying surfaces (12, 13) of the cuvette (3) are transmissive for the electromagnetic radiation radiated from the transmitting unit (2).

3. Apparatus as claimed in claim 2,
wherein the oppositely lying surfaces are ends (12, 13) or lateral surfaces (18, 19) of a tubular cuvette (3).

4. Apparatus as claimed in claim 2 or 3,
wherein the transmitting unit (2) and/or the receiving unit (4)

is/are arranged in the region of the ends (12, 13) or the lateral surfaces (18, 19) of the cuvette (3).

5. Apparatus as claimed in claim 1 or 4,
wherein the transmitting unit (2) is a multi-color, for instance a two-color, light emitting diode.

6. Apparatus as claimed in claim 1 or 3,
wherein an aperture (9) is provided between the transmitting unit (2) and/or the detector unit (4), on the one hand, and the surface transmissive for the electromagnetic radiation, e.g. end (12, 13) or lateral surface (18, 19) of the cuvette (3).

7. Apparatus as claimed in claim 1,
wherein an inlet (6) is provided in a first end region of the cuvette (3), wherein an outlet (7) is provided in a second end region of the cuvette (3),
and
wherein the inner diameter of the outlet (7) is greater than the inner diameter of the inlet (6).

8. Apparatus as claimed in claim 1 or 7,
wherein the inlet (6) and the outlet (7) are arranged in extensions of the longitudinal axis (17) of the cuvette (3),
or wherein the inlet (6) and the outlet (7) of the cuvette are arranged essentially at right angles to the longitudinal axis (17) of the cuvette (3).

9. Apparatus as claimed in claim 1 or 7,
wherein the inlet (6) is arranged at a first predetermined angle to the longitudinal axis (17) of the cuvette (3) and
wherein the outlet (7) is arranged at a second predetermined angle to the longitudinal axis (17) of the cuvette.

10. Apparatus as claimed in claim 1 or 8,
wherein at least the cuvette (3) with the inlet (6) and the outlet (7), and, optionally, the transmitting unit (2) and the

detector unit (3), are arranged as an integral measuring unit.

11. Apparatus as claimed in claim 1, 8 or 9,
wherein the cuvette (3) with the inlet (6) and the outlet (7), the transmitting unit (2) and the detector unit (4) lie essentially in one plane (15; 16).

12. Apparatus as claimed in claim 7 or 8,
wherein the measuring unit in the measuring position is inclined in such a manner relative to the horizontal plane (15), that the outlet (7) of the measuring unit lies higher than the inlet (6) of the measuring unit.

13. Apparatus as claimed in claim 12,
wherein the plane (16), in which the measuring unit is arranged, is inclined by an angle between 5° and 45° relative to the horizontal plane (15).

14. Apparatus as claimed in claim 1,
wherein at least one heating element (10) is provided, via which the temperature of the cuvette (3) is variable.